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Title of Article* Measures of Efficiency in the Takaful Industry of Bangladesh – A Non-Parametric Approach

Digital Object Identifier (if applicable)

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If insufficient space, please attach a separate sheet

Journal Name* European Journal of Business and Management

Publisher* International Institute for Science, Technology and Education Place Published* United States

ISSN* 2222-1905 Volume* 5 Issue* 11 Page No. from* 163 Page No. to* 173

Is this publication linked to a research grant? If yes, please provide title of the grant and or cost centre (if known) below.

Title of grant N/A

Fields of Research (FOR) Codes* (up to 3)
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FOR code	150203	100	%
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Keywords (up to 3)

Keyword	Data Envelopment Analysis
Keyword	Takaful
Keyword	Malmquist index

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Print Form Reset Form

EJBM-Special Issue: Islamic Management and Business
ISSN 2222-1719 (Paper) ISSN 2222-2863 (Online)
Vol.5 No.11 2013

Measures of Efficiency in the Takaful Industry of Bangladesh-A Non-Parametric Approach

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Abstract
This study aim is to examine the efficiency in the Takaful industry of Bangladesh. Data Envelopment Analysis (DEA) is used to explore the contributions of technical and efficiency changes to the growth of productivity in the Takaful industries of Bangladesh by using descriptive statistics such as mean, median, standard deviation, minimum & maximum and efficiency (Constant Returns to Scale & Variable Returns to Scale) applying the generalized output-oriented Malmquist index for the years 2009-2011. The output-input data consists of a panel of all (06) Takaful companies in Bangladesh. This study utilizes two inputs and two outputs, namely, commission and management as well as premium and net investment income, respectively. In the DEA technique, efficiency is measured by the Malmquist index. The Malmquist efficiency measures have two components: the efficiency change and technical change index. Efficiency change is again combined by pure efficiency and scale efficiency. It is found that, on geometric mean, the TFP of the Takaful industry is mainly due to both efficiency and technical changes where the main source of the efficiency change is scale efficiency rather than pure efficiency. Our finding indicates that in the Takaful industry of Bangladesh, the smaller the size of the companies, the higher the probability for the companies to be more efficient in utilizing their inputs to generate more outputs. We believe our work is beneficial for researchers and practitioners to better understand the Bangladeshi Islamic insurance industry.
Keywords: Data Envelopment Analysis (DEA); Takaful; Malmquist Index; Efficiency; Technical Efficiency; Scale Eficiency; Pure Efficiency.

1. INTRODUCTION

The primary function of insurance is to act as a risk transfer mechanism to provide peace of mind and protect against losses (Sabbir, 2002). Insurance schemes utilize the combination method by persuading a large number of individuals to pool their risks into a large group to minimize overall risk (Ali, 2000). In the developed world, insurance is part of society such that some forms of cover are required by law. In developing countries, the need for such a safety net is much greater, particularly at the poorest levels where vulnerability to risks is much greater and there are fewer opportunities available to recover from a large loss. Therefore, in the developing countries which are characterized as having low-income levels, and lacking access to social security systems, healthcare, and education, sanitation, and employment opportunities, the need for insurance as a risk transfer mechanism is even more imperative.

The efficiency of financial institutions has been widely and extensively studied in the last few decades. For financial institutions, efficiency implies improved profitability, greater amount of funds investment, better prices and services quality for consumers and greater safety in terms of improved capital buffer in absorbing risk (Berger *et al.,1993*). Furthermore, the Bangladeshi financial system has undergone major structural changes in the era of globalization with various liberalization measures being introduced during the last few decades. These factors are expected to have an impact on the efficiency of the life insurance companies and the *Takaful* operators. This study, therefore, focuses on to extend the established non-conventional insurance sector by investigating the efficiency of the Takaful companies/operators in Bangladesh for the period 2009-2011. For the *Takaful* operators, the information obtained on the evaluation of the institutions' performance may be used to improve the overall efficiency of their operations and in turn, may contribute towards achieving its competitive edge.

In this context, the objective of this study is to analyze the sources of efficiency and technical changes of all the Takaful companies in Bangladesh. By using the descriptive statistics and non-parametric approach of Data Envelopment Analysis (DEA) together with Malmquist Index, we isolate the contributions of technical change, efficiency change, the pure and scale changes to total factor productivity growth of different *Takaful* operators in

Bangladesh. Encouraged by the increase in the public awareness in Islamic finance, the *Takaful* industry in Bangladesh continues to enhance its competitiveness.

In recent years, Islamic finance has become one of the most rapidly growing segments of the global financial system. The introduction of an Islamic model of insurance has boosted the Islamic world economy, according to many reports. Insurance has become the biggest industry in Bangladesh economy. The world's first Takaful insurance company was established in Sudan in 1979, and since then Takaful insurance companies have spread around the world. In Bangladesh, Takaful operators have been started their business from the year 2000. However, in Bangladesh, the insurance companies of private sectors are growing in the last few years. During our study period, the growth rate of insurance industry is 27.75%, 16.56% and 19.27% in the years 2009, 2010 and 2011 respectively. On the other hand, in terms of premium, the growth rate of Takaful industries is only 0.45%, and 5.5% in the year 2011, and 2010 respectively. The researchers want to investigate why the growth rate of Takaful is lower than conventional insurance growth rate, though the 89% to 90% of the people of Bangladesh are Muslim. This is the main research question or motivation to measure the efficiency of the Takaful operation in Bangladesh. No study has been done yet to measure the efficiency of the Takaful industries of Bangladesh.

This study utilizes two inputs, namely, commission and management expenses and two outputs, i.e. premium and net investment income. The paper is organized as follows. Section 2 presents the literature review and in Section 3, we discuss the methodology of DEA and Malmquist Index. Section 4 presents the results and analysis and finally, Section 5 concludes.

2. LITERATURE REVIEW:

Efficiency comparisons at the international level have received significant attention in the insurance literature. In this study, we have detailed overview of 19 international studies, including their sample periods, lines of business covered, method used, types of efficiency analyzed, inputs and outputs used and summery of findings. However, all the 19 studies are analyzed by using Data Envelopment Analysis (Both VRS & CRS), Malmquist Index (both Technical and Efficiency), and Stochastic Frontier Model such as Cobb-Douglas frontier model for 19 different countries. The researchers studied to cover different countries from different continents. Growth in productivity is observed for most of the countries, which is attributed to improvements in technical progress.

A study by Weiss (1991) applied Stochastic Frontier Approach (SFA) to compute the efficiency of 100 US property & liability insurance companies over the period 1980 to 1984. The estimated results indicated cost inefficiency of around 12 to 33 percent amongst the US insurers. Cummins et al (1996) investigated the general level of technical efficiency over time in the 94 life and non-life insurers of Italy over the period 1985-1993. This study used the DEA technique to compute the efficiency scores and found that the efficiency amongst the insurers remain around 70% to 78% over the study period. Fukuyama (1997) investigated productive efficiency and productivity changes of Japanese life insurance companies by focusing primarily on the ownership structures (mutual and stock) and economic conditions (expansion and recession) where he found that productive efficiency and productivity performances differ from time to time across the two ownership types under different economic conditions. Fukuyama (1997) found that stock and mutual life insurers in Japan have approximately equal technical efficiency scores. For the sample period 1989-1992, Fukuyama (1997) found the average technical efficiency in the Japanese life insurance industry to be about 0.91 and total factor productivity gains of about 19 percent. Cummins and Zi (1998) conducted their study by using DEA to measure the efficiency of US insurance companies over the periods 1988 to 1995. They examine effects of merger in firms' efficiency and found that acquired firms achieve greater efficiency gains than firms that have not been involved in mergers or acquisitions. They also found mergers and acquisitions in the life insurance industries have had a beneficial effect on efficiency. The general level of efficiency in both developed and developing countries has been examined by many researchers but the results are mixed in both types of insurance markets. Moreover, Cummins and Weiss (1999) applied DEA to compute the efficiency of 750 life insurers of U.S. for the period 1988 to 1995 and found lower efficiency scores amongst the insurance firms as compared to other financial institutions. Kessner and Polborn (1999) applied Data Envelopment Analysis (DEA) to measure the efficiency of 110 life insurers of Germany over the period 1990 to 1993 and found that the higher number of insurers in the insurance market of Germany were inefficient. Another study by Mansoor and Radam (2000) examined the general level of technical efficiency and productivity for 12 Malaysian life insurers using DEA approach over the period 1987-1997. Although the study reported an increase in the productivity of the insurers, yet the increase in productivity was less compared to the growth rate of the economy. In addition, Diacon Stephen (2001)

conducted his study to evaluate the general efficiency using Farrel Efficiency Scores for 431 of general insurance companies of UK over the period of 1998 and 1999 and found that UK companies inefficiency improvements in comparison with their European counterparts.

Another study by Noulas et al. (2001) investigated the efficiency of 16 non life insurance companies by using DEA-CCR model in Greek over the periods of 1991 to 1996 and found that Industry highly inefficient, with notable differences between different companies. In addition, another study showed that insurance companies were under pressure to upgrade their efficiency relative to their competitors in Austria (Mahlberg and Url, 2003). Barros et al (2005) found positive relation to the efficiency scores captured by the trends of 14 life insurance of Portugal over the period 1995 to 2003. For instance, Tone and Sahoo (2005) investigated the general level of efficiency over time in the Indian life insurers using DEA over the period 1982-2001. The estimated results indicated that the allocated inefficiencies amongst the life insurers of India increased after 1994 whereas the cost efficiency also increased after 2000. Barros, Barroso and Borges (2005) conducted their study to examine the efficiency of 27 insurance companies using DEA Malmquist index in Portugal over the period of 1995 to 2003 and found that public policy to encourage the adoption of disincentives to principal-agent relationships and the collective-action problem would yield increased efficiency

Overall, regarding the empirical studies discussed above, the differences in sample periods might be important in explaining inconsistent results. Moreover, comparability of the studies is limited by differences in the subject of investigation and the methodology employed. Thus, the major contribution of this paper is to extend existing literature as to the number of countries analyzed, and also with regard to the methodologies used, with the aim of shedding a brighter light on efficiency in international insurance markets.DEA is a model that combines all the inputs and outputs information on the firm into a single measure of productive efficiency that lies between zero (i.e. a completely inefficient firm) and unity (i.e. a completely efficient firm). In addition, the DEA effectively estimates the frontier by finding a set of linear estimates that bound (envelop) the observed data (Leong et al., 2003). Thus, this technique is a benchmarking technique in the sense that the "best practice" firms lie on the frontier and envelop other inefficient firms (Neal, 2004). Previous studies on the insurance industry's efficiency using DEA provided evidence to understand the performance of the insurance sector in certain countries, e.g. those studies which analyze insurance in national markets such as the case in the United States done by Berger et al. (1997), Cummins et al. (1999), Meador et al. (2000), Cummins and Weiss (2002) and Cummins et al. (2010), and the insurance industries in other countries like in Japan, Italy, United Kingdom, Australia, Spain, and Germany have been studied by Fukuyama (1997), Cummins et al. (1996), Diacon (2001), Worthington and Hurley (2002), Cummins and Rubio-Misas (2001), and Mahlberg and Url (2010), respectively. Besides that, there are also studies that conduct analyses of the insurance industry in multi-markets such as Rees and Kessner (2000) and Diacon et al. (2002) where they have conducted studies by internationally comparing the efficiency of insurance companies in Europe.

In addition, considering the Malaysia like Bangladesh twofold local financial system environment where the Takaful operators are operating in parallel with their conventional counterparts, another recent study was undertaken by Saad et al. (2007) to analyze the sources of efficiency and technical changes of all the life insurance companies and compare the performance results with that of the Takaful operators in Malaysia. Using a sample of 13 Malaysian insurance companies over a period of 2002 to 2005, they used a non-parametric approach of DEA together with the Malmquist Index to isolate the contributions of technical change, efficiency change, the pure and scale changes to the total factor productivity growth of different life insurance companies and the Takaful operators. On the basis of the findings, the authors found that on average, the total factor productivity growth of the insurance industry in Malaysia is mainly due to technical change while efficiency change contributed a negative change. While Takaful presents a below average in total factor productivity but slightly above average for technical change as well as an equal to industry average in scale efficiency. However, this result is still inconclusive on the Takaful industry as a whole. Thus, the overall productivity growth of the insurance industry in Malaysia over the sample period was more or less contributed by both technical efficiency and technical progress. Wu et al., 2007 found that Canadian life and health insurance companies operated very efficiently. Another study on Nigeria that most of the companies there were VRS efficient (Barros/Obijiaku, 2007). Abidin & Cabanda (2009) has applied DEA in order to find out the general efficiency of 23 non-life insurance companies in Indonesia over the period of 2005 to 2007 and found that bigger insurance companies were more efficient than smaller firms. Afza & Ali Asghar (2010), applied non-parametric Data Envelopment Analysis (DEA) to estimate the efficiency of 38 life and non life insurance companies in Pakistan over the period 2003 to 2007 and found that the insurance companies were on average 92.7 percent technical efficient,

81.12 percent allocated efficient and 75.44 percent cost efficient. Moreover, the study had also found that allocated and cost efficiencies are improved from 2003 to 2005 but significantly decreased in 2006 whereas; technical efficiency is increased over the study period. Saeidy & Kazentipour (2011) conducted their study to examine the efficiency of all public and private insurance companies in Iran by using DEA over the period of 2005-2009 (1383-1387 in Persian calendars) and found that the performance of State owned insurance was better than private insurance companies. Saad(2012) conducted his study to examines the efficiency of 28 general or non-life Takaful and insurance industry by using DEA in Malaysia during the period 2007 to 2009 and found that the efficiency of the Takaful companies below the level of their conventional counterparts.

Against this background, the motivation of our paper is to investigate the efficiency of the both life and non-life Takaful and insurance industry in Bangladesh using the nonparametric approach. We also hope to shed some light on the performance of the Takaful operators.

3. *DATA SOURCES AND METHODOLOGY*

In order to measure the efficiency of the Takaful industry of Bangladesh. There are 02 public insurance company, 43 privately owned general companies and 17 life insurers in Bangladesh. There are 09 Takaful operators are operated in Bangladesh, out of which the data of three foreign companies namely First Takaful Insurance Company, Noor Takaful insurance company limited and National Takaful Insurance Company operators were not accessible. The data of remaining 06 companies was available for efficiency analysis. We use two inputs and outputs in this study. The inputs are commission and management expenses and the outputs are premium and net investment income. These inputs and outputs are used to examine the efficiency of all (06) Islamic insurance firms in Bangladesh, namely Fareast Islami Life Insurance Company (FILIC), Islami Commercial Insurance Company (ICIC), Islami Insurance Bangladesh Limited (IIBL), Padma Islami Life insurance Limited (PDILIL), Prime Islami Life Insurance Limited (PILIL) and Takaful Islami Insurance Limited.(TIIL) Inputs and outputs data are collected from period of 2009 to 2011. The data are gathered from the respective Takaful annual reports, websites and chief finance officer (for ICIC because of unavailable audited annual report).

To examine the contributions of technical and efficiency change to the growth of productivity in the Takaful industries the generalized output-oriented Malmquist index, developed by Fare et al. (1989) is adopted in this study. The Malmquist indexes are constructed using the Data Envelopment Approach (DEA) and estimated using Coelli's (1996) DEAP version 2.1. Malmquist index was chosen as there are a number of desirable features for this particular study. The DEA does not only require input prices or output prices in their construction, which make the method particularly useful in situations in which prices are not available publicly or non-existent, but it also does not require a behavioral assumption such as cost minimization or profit maximization in the case where the producers'' objectives differ, unknown or unachieved. This is first demonstrated by Fare et al. (1989) using the geometric mean formulation of the Malmquist index. Following this, Forsund (1991) derived the decomposition of the simple version of the Malmquist productivity index into technical change and efficiency change. Following Fare et al. (1989), the Malmquist index of total factor productivity growth is written as follows:

$$M_0(x^t, y^t, x^{t+1}, y^{t+1}) = \frac{D_0^{t+1}(x^{t+1}, y^{t+1})}{D_0^t(x^t, y^t)} \times \sqrt{\left[\left(\frac{D_0^t(x^{t+1}, y^{t+1})}{D_0^{t+1}(x^{t+1}, y^{t+1})}\right)\left(\frac{D_0^t(x^t, y^t)}{D_0^{t+1}(x^t, y^t)}\right)\right]} \qquad (1)$$

Where, $D_0^t(x^{t+1}, y^{t+1})$, denoted the distance from the period $t+1$ observation to the period t technology. The first part of the right hand side of equation (1) measures the change in firm's relative efficiency (i.e., distance between the observed productions from maximum potential production) between year t and $t+1$. On the other hand, second parts of this equation within the brackets (geometric mean of the two ratios) shows the firms' relative change in technology (i.e., movements of the frontier function itself) between the two periods evaluated at x^t and x^{t+1}. Basically, the change in relative efficiency measures how well the production process converts inputs into outputs (catching up to the frontier) and the later reflects enhancement in technology. According to Fare et al. (1994a), improvements in productivity yield Malmquist index values greater than unity. Deterioration in performance over time is associated with a Malmquist index less than unity. The same interpretation applies to the values taken by the components of the overall TFP index. The positive change in the efficiency component yielded index values greater than one and is considered to be evidence of catching up (to the frontier). Values of the technical change component greater than one are considered to be evidence of technological progress.

Following Fare et al. (1994), this study uses an enhanced decomposition of the Malmquist index by decomposing the efficiency change component calculated relative to the constant returns to scale technology into a pure efficiency component (calculated relative to the VRS technology) and a scale efficiency change component which captures changes in the deviation between the VRS and CRS technology. The subset of pure efficiency change measures the relative ability of operators to converts inputs into outputs while scale efficiency measures to what extent the operators can take advantage of returns to scale by altering its size toward optimal scale.

4. FINDINGS AND ITS ANALYSIS:

4.1 Measures of some Descriptive Statistics

We want to analyze some descriptive statistics such as mean, median, Standard Deviation, minimum and maximum before run data envelopment analysis. Table-1 reveals the descriptive statistics of the outputs and inputs of all the Takaful companies during the period of study. In case of total inputs and outputs during the period of analysis, FILIC and ICIC have occupied the highest and lowest rank respectively. The average premium and net investment income are Tk. 1689.66 and Tk. 267.34 million BDT, respectively. Meanwhile, the average commission and management expenses are Tk. 484.42 and Tk.261.23 millions BDT, respectively during study period 2009-2011.

Table 1: Descriptive Statistics, 2009-2011

Statistics	Inputs (In million BDT)		Outputs (In million BDT)	
	Commission	Management Expenses	Premium	Investment Income
Mean	484.42	261.23	1689.66	267.34
Median	189.87	160.76	670.41	106.64
Standard Deviation	687.58	256.62	2372.83	316.40
Minimum	28.74	33.29	13.96	16.99
Maximum	2213.71	849.04	6908.76	1131.33

Source: Annual Reports of respective Takaful Companies

4.2. Production Frontier and Efficiency

The primary purpose of this section is to outline a number of commonly used efficiency measures and to discuss how they calculated relative to an efficient technology, which is generally represented by some form of frontier function. Tables 2 and 3, reports efficiency change for the Takaful companies from 2009-2011 under constant returns to scale (CRS) and variable returns to scale (VRS) respectively, since the basic component of the Malmquist productivity index is related to measures of efficiency. For the values of unity, the firm is implied to be on the industry frontier in the related year, while the values that are less than unity imply that the firm is below the frontier or technically inefficient. Thus, the lower the values from unity, the firm is said to be more inefficient compared to the values closer to one. For the years reported in tables 2 and 3, all the Takaful companies are consistently efficient, both under constant returns to scale (CRS) and variable returns to scale (VRS) except ICIC and PDILIL. Meanwhile, ICIC is consistently efficient under VRS but not under CRS. Moreover, the PDILIL is the least efficient firm for both CRS and VRS versions respectively.

Table 2: Efficiency of the Takaful Companies, 2009-2011 (Constant Returns to Scale)

SL. No.	Name of the Takaful Company	2009	2010	2011
1	Fareast Islami Life Insurance Company	1.000	1.000	1.000
2	Islami Commercial Insurance Company	0.519	0.542	0.325
3	Islami Insurance Bangladesh Limited	1.000	1.000	1.000
4	Padma Islami Life insurance Limited	0.746	0.756	0.991
5	Prime Islami Life Insurance Limited	1.000	1.000	1.000
6	Takaful Islami Insurance Limited	1.000	1.000	1.000
	Mean	0.877	0.883	0.886

The values in Tables 2 and 3 show the percentage of the realized output level compared to the maximum potential output level at the given input mix. As per example, in 2009, ICIC produced 51.9 percent of its potential output level and PDILIL produced 74.6 percent of its potential output under CRS. Under VRS in the same year, the PDILIL produced the potential output as same as 74.6 percent whereas, ICIC produced at their maximum potential output, which was at 100 percent. In 2010 ICIC produced 54.2 percent of its potential output level and also decrease in 2011

and PDILIL produced 75.6 percent of its potential output under CRS. Under VRS in the same year, the PDILIL produced the potential output as same as 76.5 percent whereas, ICIC produced at their maximum potential output, same as 2009. As indicated by the weighted geometric mean in Tables 2 and 3, the average efficiency for the whole industry increases for the period 2009 to 2011 under CRS. Meanwhile, under VRS, the average efficiency for the whole industry is same between 2009 and 2010 but shows a slight increase in later years reached at maximum potential output, which was at 100% percent. On average, efficiency performance of the Takaful industry is relatively higher based on VRS than CRS.

Table 3: Efficiency of the Takaful Companies, 2009-2011 (Variable Returns to Scale)

SL. No.	Name of the Takaful Company	2009	2010	2011
1	Fareast Islami Life Insurance Company	1.000	1.000	1.000
2	Islami Commercial Insurance Company	1.000	1.000	1.000
3	Islami Insurance Bangladesh Limited	1.000	1.000	1.000
4	Padma Islami Life insurance Limited	0.764	0.765	1.000
5	Prime Islami Life Insurance Limited	1.000	1.000	1.000
6	Takaful Islami Insurance Limited	1.000	1.000	1.000
	Mean	0.961	0.961	1.000

4.3. Productivity Performance of the Individual Company

As we know, Malmquist TFP index to measure productivity change and to decompose these productivity change into technical change and technical efficiency change. Tables 4 to 5 report the performance of the firms from 2009 to 2011 in terms of TFP change and its two subcomponents which are technical change and efficiency change respectively. Note that a value of the Malmquist TFP productivity index and its components of greater than one imply improvements of productivity in the relevant aspects, while values less than one indicate a decrease or deterioration in productivity. Subtracting 1 from the number reported in the table gives an average increase or decrease per annum for the relevant time period and relevant performance measure. These measures also capture the performance relative to the best practice in the relevant performance or relative to the best practice in the sample.

Table 4: Takaful Companies Relative Malmquist TFP Change between Time Period t and t + 1, 2009-2011

SL. No.	Name of the Takaful Company	2009-2010	2010-2011	Mean
1	Fareast Islami Life Insurance Company	0.868	0.874	0.871
2	Islami Commercial Insurance Company	1.063	0.745	0.904
3	Islami Insurance Bangladesh Limited	1.113	1.281	1.197
4	Padma Islami Life insurance Limited	0.982	1.167	1.075
5	Prime Islami Life Insurance Limited	0.906	0.959	0.933
6	Takaful Islami Insurance Limited	1.355	0.816	1.086
	Mean	1.036	0.956	0.996

Table 4 portrays calculated changes in the Malmquist-based Total Factor Productivity index. As shown in the results, IIBL has positive productivity changes during the adjacent years of 2009-2010, 2010-2011. On the other hand, ICIC and PILIL have positive productivity changes for the adjacent years of 2009-2010, but they faced deterioration in productivity in 2009-2011. In contrast, PDILIL recorded deterioration in TFP for the year 2009-2010 where in the next year recorded marked improvement in TFP at 2010-2011. Moreover, FILIC and PILIL have faced positive productivity changes during the adjacent years of 2009-2010 and 2010-2011. In addition, IIBL has occupy the first rank with 19.7 percent average TFP annual growth rate, followed by TIIL with an annual rate of 08.6 percent, and then PDILIL ranked third with an annual rate of 07.5 percent. The TFP change, on average, only showed very few significant growths in the periods of 2009-2010, with 03.6 percent. However, it deteriorated in 2010-2011, which is 04.4 percents.

The Malmquist TFP index is further decomposed into its two components, technical change and efficiency change. The results of technical change and efficiency change are displayed in Tables 5 and 6. Table 5 portrays the index values of technical progress or retreat as measured by average shifts in the best-practice frontier from period *t* to *t+1*. According to the results, all the firms experienced both technical progress and retreat. Howover, ICIC and IIBL are the firms that experienced technical progress for the periods of 2009 to 2011. In contrast, Fareast Islami Life Insurance Company, PDILIL and PILIL are the firms that have experienced technical retreat for the periods of 2009 to 2011. During the study period TIIL has positive productivity changes for the years of 2009-2010, but they faced a

reduction in productivity in 2010-2011. On the other hand, TIIL has been achieved the maximum change in technical progress (35.5 percent) in the period 2009-2010 and maximum retreat in 2010-2011 , while IIBL achieved the highest technical growth between the period 2010-2011 with 28.1 percent. During the study period, 03 Takaful companies have achieved average technical progress. By considering the mean, IIBL occupies first rank with 19.7%, followed by ICIC with 13.0% and TIIL with 8.6%. In contrast, FILIC was found as the most technical regressive firm (12.9 percent).

Table 5: Takaful Companies Relative Technical Change, 2009-2011

SL. No.	Name of the Takaful Company	2009-2010	2010-2011	Mean
1	Fareast Islami Life Insurance Company	0.868	0.874	0.871
2	Islami Commercial Insurance Company	1.017	1.242	1.130
3	Islami Insurance Bangladesh Limited	1.113	1.281	1.197
4	Padma Islami Life insurance Limited	0.969	0.890	0.930
5	Prime Islami Life Insurance Limited	0.906	0.959	0.933
6	Takaful Islami Insurance Limited	1.355	0.816	1.086
	Mean	1.026	0.995	1.011

Table 6 reveals the changes in relative efficiency for each individual company. The results indicate considerable variation across companies and time. It is very good to see that all the Takaful companies have been found to be consistently efficient, except ICIC through the year 2009 to 2011. During the entire period of study, the results indicate that, on average, the only Islamic insurance firm under study, i.e. PDILIL experienced the highest efficiency change with 16.3 percent, while only ICIC that experienced efficiency decline by (-17.8 %). finally, the result shows that an improvement have been seen in relative efficiency throughout these years with a slight deterioration during the period 2009-2011 at -1.5 percent.

Table 6: Changes in Firms Relative Efficiency, 2009-2011

SL. No.	Name of the Takaful Company	2009-2010	2010-2011	Mean
1	Fareast Islami Life Insurance Company	1.000	1.000	1.000
2	Islami Commercial Insurance Company	1.044	0.600	0.822
3	Islami Insurance Bangladesh Limited	1.000	1.000	1.000
4	Padma Islami Life insurance Limited	1.013	1.312	1.163
5	Prime Islami Life Insurance Limited	1.000	1.000	1.000
6	Takaful Islami Insurance Limited	1.000	1.000	1.000
	Mean	1.009	0.961	0.985

In order to examine a change in scale efficiency, the efficiency change is further decomposed into two subcomponents, namely pure efficiency change and scale efficiency change in which the results are reported in Table 7. The results indicate that the pure efficiency and scale efficiency appear to be an equally important source of growth to efficiency change. All the Takaful companies recorded no changes in annual growth for both the scale and pure efficiencies, except ICIC and PDILIL during the period 2009 to 2011. Relative to other insurance firms, ICIC have attained the highest deterioration and the highest growth of scale efficiency at (-40.0) percent and 4.4 percent during the study period through 2009-2011.

Table 7: Changes in Efficiency Components by Firms between Time Period t and t + 1, 2009-2011

SL. No.	Name of the Takaful Company	2009-2010		2010-2011	
		PECH	SECH	PECH	SECH
1	Fareast Islami Life Insurance Company	1.000	1.000	1.000	1.000
2	Islami Commercial Insurance Company	1.000	1.044	1.000	0.600
3	Islami Insurance Bangladesh Limited	1.000	1.000	1.000	1.000
4	Padma Islami Life insurance Limited	0.995	1.018	1.316	0.997
5	Prime Islami Life Insurance Limited	1.000	1.000	1.000	1.000
6	Takaful Islami Insurance Limited	1.000	1.000	1.000	1.000
	Mean	0.999	1.010	1.047	0.918

Note: PECH = Pure Efficiency Change, and SECH = Scale Efficiency Change.

In terms of pure efficiency, PDILIL have achieved the highest deterioration by very significant -0.50 percent in 2009-2010. It is interesting to note that although PDILIL attained the highest deterioration in pure efficiency; it also experienced the highest growth in pure efficiency with 31.60 percent in the next period. During the entire period of study, we have identified as the years of pure efficiency improvement, while deterioration are recorded to be the years of scale efficiency.

4.4. Productivity Performance of the Industry

Table 8 summarizes the performance of the Malmquist productivity index of the whole takaful industry in Bangladesh during the year 2009 and 2011. On average, IIBL recorded the highest growth in TFP and technical changes with 19.4%, no efficiency change. In contrast FILIC has shown result the lowest growth in TFP and same as technical change with (-12.1) percent and interesting see that no change in efficiency. PDILIL took the second rank by having TFP of 7.0 percent, which is mainly contributed by efficiency progress (15.30 percent), but technical change are deteriorated with -7.1%. On average, the TFP of the Takaful industry is just below the pure efficient level, mainly due to both efficiency and technical changes with -1.5 and 0.01 percents, respectively. Furthermore, the efficiency change is largely contributed by pure efficiency rather than scale efficiency. This indicates that the size of the companies is not a factor in affecting efficiency changes. This study found that there were very few substantial growths in technical components and efficiency change which suggest that TFP in the Takaful industry is due to the innovation in technical components coupled with a considerable improvement in the efficiency aspect. On average, the insurance firms were found to be experiencing a technical progress. Even though there was no improvement in efficiency change, the subcomponent of this efficiency change, namely pure efficiency, shows a minor improvement (2.3 percent) and a negative change in scale change. Takaful industry of Bangladesh has faced more negative impact of efficiency than a positive technical changes, the overall TFP for these firms within the period of study is maintained at a value slightly lower than 1 (reflected by the mean 0.995 of TFP change).

Table 8: Summary of the Malmquist Productivity Index of Takaful Companies, 2009-2011

SL. No.	Name of the Takaful Company	EFFCH	TECHCH	PECH	SECH	TFPCH
1	Fareast Islami Life Insurance Company	1.000	0.871	1.000	1.000	0.871
2	Islami Commercial Insurance Company	0.791	1.124	1.000	0.791	0.890
3	Islami Insurance Bangladesh Limited	1.000	1.194	1.000	1.000	1.194
4	Padma Islami Life insurance Limited	1.153	0.929	1.144	1.007	1.070
5	Prime Islami Life Insurance Limited	1.000	0.932	1.000	1.000	0.932
6	Takaful Islami Insurance Limited	1.000	1.051	1.000	1.000	1.051
	Mean	0.985	1.01	1.023	0.963	0.995

Note: TFPCH = Total Productivity Change; EFFCH = Efficiency Change; TECHCH = Technical Change; PECH = Pure Efficiency Change; and SECH = Scale Efficiency Change.

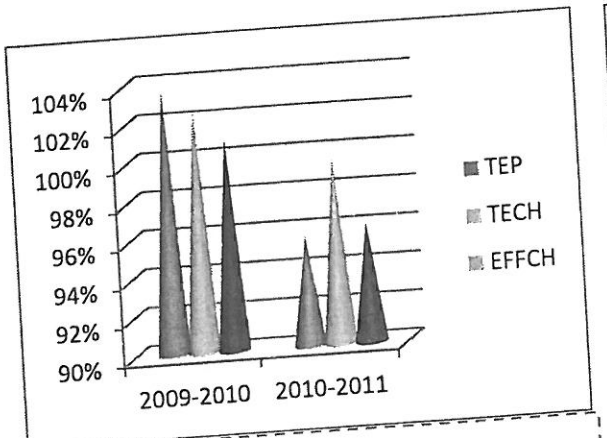

Figure 1: Changes in Mean TFP and Its Components

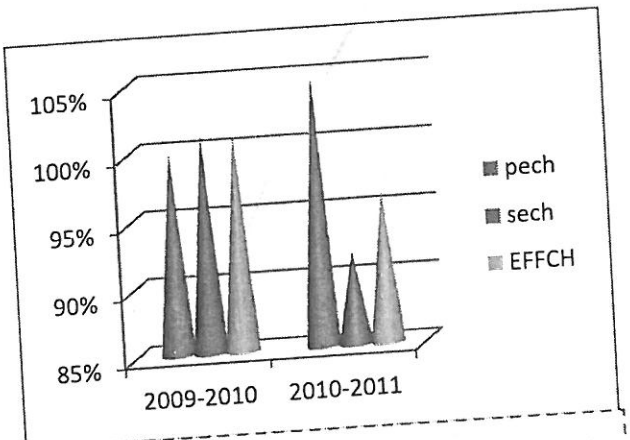

Figure 2: Changes in Mean Efficiency and Its components

Figure 1 reveals the mean evolution over time of TFP and its components for the Takaful industries measured by the geometric mean of the Malmquist productivity index for each period. The figure displays that on average, TFP occupied the maximum growth in technical efficiency during the 2009-2010 and decrease of TFP in the subsequently periods of 2010-2011 which was largely contributed by the improvement of technical change rather than efficiency change. Finally, Figure 2 presents the visual summary of changes in the mean efficiency and its components which are scale and pure efficiencies for the entire study periods. For the study period of 2009-2011, the mean efficiency change decline within the study period which has made a significant impact on the overall of TFP change. On the other hand, in case of pure and scale efficiency, pure efficiency is experienced by a significant amount of deterioration but the situation reverses in case of scale efficiency. According to the figure, it seems that the change in efficiency has declined by a change in scale efficiency rather than a change in pure efficiency.

5. Conclusions

The researchers used DEA to explore the contributions of technical and efficiency change to the growth of productivity in the Takaful Industries in Bangladesh by applying the generalized output-oriented Malmquist index for the years 2009-2011. The efficiency measures of Takaful operators are comparatively measured where it is found on the point of efficiency, the TFP of the Islamic insurance industry in Bangladesh is near about efficient due to improvement in technical changes rather deterioration in efficiency change with 0.01and (-01.5) percents respectively. Furthermore, the efficiency change is contributed by the pure efficiency rather than scale efficiency. This indicates that the size of the companies have a very limitd influence in affecting efficiency changes. However, this study also found that there were diminutive significant growths in technical components and no improvement in efficiency change which suggest that TFP in the Islamic insurance industry is due to the less innovation in technical components coupled with a insignificant improvement on the aspect of efficiency. On average, the insurance firms are found to be experiencing a technical progress. In contrast there was a slight decline in efficiency change, the subcomponent of this efficiency change, namely pure efficiency, did show a slight improvement (2.3 percent). However, deterioration in the scale efficiency (-3.7 percent) can't offsets the scale efficiency deterioration effect thus giving a small decrease efficiency change. Hence, this finding indicates in the Takaful industry of Bangladesh that the smaller the size of the companies, the higher the probability for the companies to be more efficient in utilizing their inputs to generate more outputs. Due to the negative impact of the efficiency, the overall TFP for these firms within the period of study is maintained at a value just lower than 1 (reflected by the mean 0.995 of TFP change). Overall, IIBL has recorded the highest growth in TFP with 19.4 percent and efficiency change (just 1) and technical changes with 19.4 percent. FILIC, on the other hand, recorded the lowest growth in TFP with (-12.9) percent, which is mainly due to technical regress (-12.9 percent). The findings of this study give significant benefits to the Takaful operators in assisting them to take strategies in terms of the operations and management in order to improve the efficiency of both industries in utilizing their inputs to generate more outputs, thus, improving their competitive edge and strengthening their positions in the industry further. This result indicates that Takaful industries have a great potential to further increase their TFP through improvements in both efficiency and technical component such as enhancing the use of information and communication technology in order to provide good services to customers.

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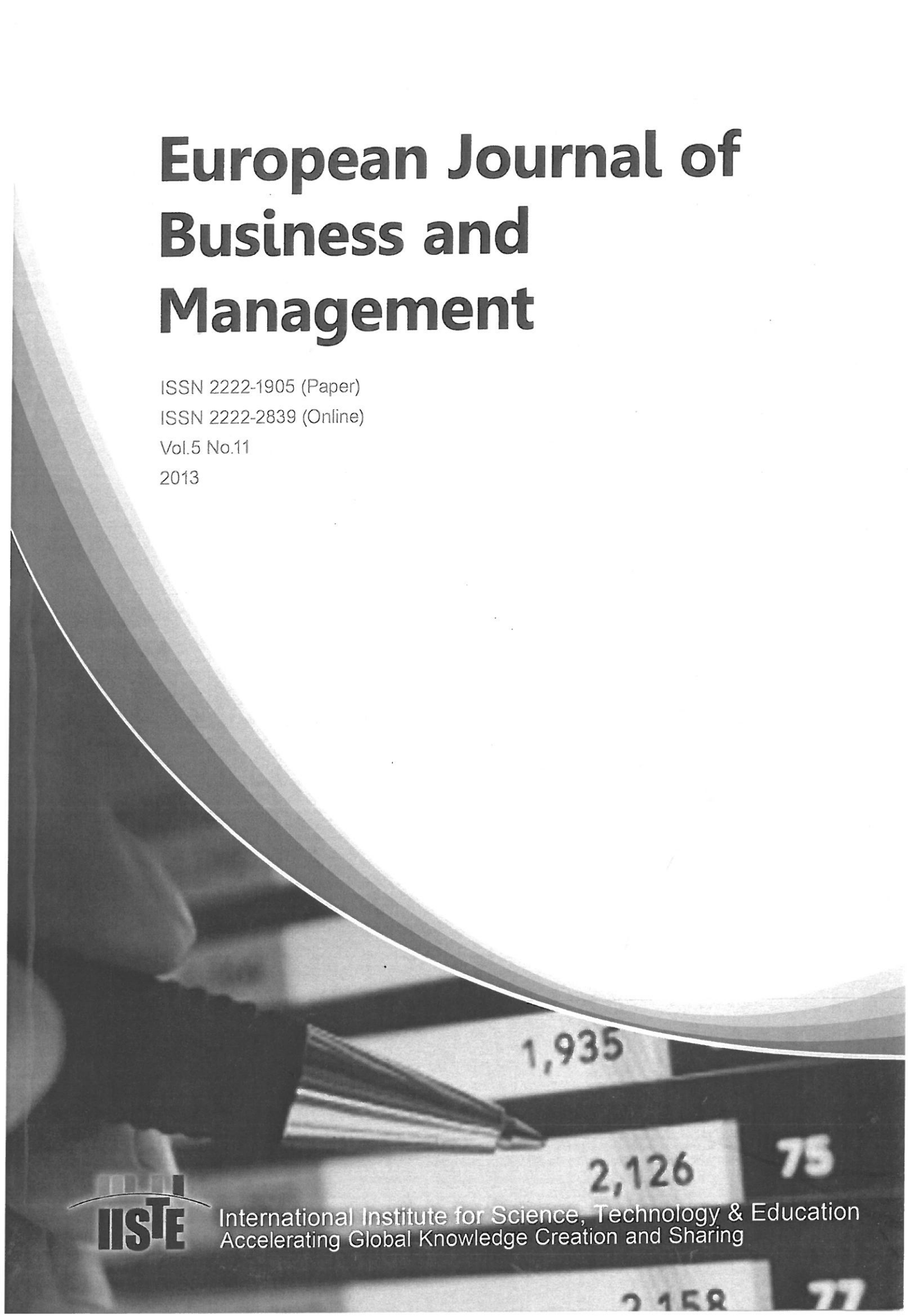

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The Effects of Standardized Water Accounting: Evidence from the Water Accounting Standards in Australia

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Abstract: The Water Accounting Standards Board was formed in 2009 to implement a sustainable water usage plan for Australia. The Board, which is the national water accounting standard setter of whole Australia, has made the definition of water accounting. The present study discusses the Australian government's decision to create the Board in terms of public interest and stakeholder theories. We also discuss whether the Water Accounting Standards Board is effective and how to make it more effective. It can be concluded that the theoretical perspectives of public interest theory and stakeholder theory are important in developing and encouraging the usage of a water reporting standard. In addition, the theoretical perspectives of public interest theory and legitimacy theory are also vital in determining effectiveness of the standard. Finally, the theoretical perspective of capture theory is critical in highlighting the threat of what would happen if the Board became controlled by the related businesses.
[Hu H, Jiang Y, Jin Q, Islam J. **The Effects of Standardized Water Accounting: Evidence from the Water Accounting Standards in Australia.** *Life Sci J* 2013;10(3):427-432] (ISSN: 1097-8135). http://www.lifesciencesite.com. 63

Keywords: Water accounting; standards; public interest; stakeholder theory; legitimacy theory; environmental issues; Australia

1. Introduction

Australia is a nation which leads the world in the developing general purpose water accounting. In 2006, the Sinclair Knight Merz Stocktake (SKMS) report analysed Australia's existing water accounting practices and outlined the problems of the current water accounting standards. As a matter of fact, there was no water accounting standards a few decades age. The only stakeholders being focused on were water managers and their direct customers and there was no regard for information given to external parties. These issues led to the Water Accounting Development Committee (WADC) being established in 2007. In late 2008, the WADC was placed under the guidance of the Australian Government Bureau of Meteorology (BOM), ultimately becoming the Water Accounting Standards Board (WASB). The WASB was formed in 2009 to implement a sustainable water usage plan for Australia.

The WASB, which is the national water accounting standard setter of the whole country, has responsibility for overseeing and coordinating water accounting standards development. According to a strict definition, water accounting is "a systematic process of identifying, recognizing, quantifying, reporting, and assuring information about water, the rights and other claims to that water, and the obligations against that water" (WASB, 2009).

The WASB is independent of the BOM and is in charge of overseeing the development of water accounting standards. In 2009, the WASB developed its own conceptual framework for preparing water accounting reports, the General Purpose Water Accounting Reports (GPWARs). The GPWARs are designed to release information on water and the rights of watering (WASB, 2010). In the process of developing GPWARs, the WASB has applied financial accounting principles, concepts, methods and practices to record water quality and quantity instead of financial values (Chalmers et al., 2012). This has been culminated in the development of the Exposure Draft of Australian Water Standard 1 (ED AWAS 1) in 2010. ED AWAS 1 is currently a voluntary standard and its usage is only compulsory for the BOM until more feedback has been received on its effectiveness. The WASB hopes the GPWARs can be regularly adopted by the water industry by 2030. Further timeline information and updates on the standards for future reference can be found on the official website of the WASB (WASB, 2013).

In the following sections of this study, we discuss and try to explain the Australian Commonwealth Government's motivation and purpose to create the WASB in terms of public interest theory, stakeholder theories, etc. We will also discuss whether the governments and the public regard the WASB to be effective by reviewing public interest and legitimacy theories as well as briefly discussing some threats to the WASB mandate by analysing capture theory of regulation

implementation. It can be revealed that the variability of water volume and quality raises growing public concern in dozens of countries and it is especially important in Australia (Chalmers et al., 2012).

2. The Regulation of Water Accounting

Australia's particular water accounting has excited people's interest globally. However, there has always been controversy among academics about the necessity of regulating water accounting. The regulation of accounting has become a major issue since the economic crash in late 1920s. One main reason is the information asymmetry, which usually creates an unequal distribution of information and could violate the objective use of the accounting information (Deegan, 2009). Therefore, an expert body that has the professional competence will be introduced to provide or supervise the provision of specific accounting information. According to Godfrey's (2011) study, markets do not always operate for the best interests of society and it is uncertain that market power will operate by optimising the allocation of resources to promote the efficiency of society. This is where the public interest theory is applied.

Public interest theory states that regulation is initially put in place to benefit society as a whole but it is not for the vested interests of the regulators or primary stakeholders. Water is a kind of resource which all Australians, as well as people all over the world, depend on and its excessive consumption and depletion will have negative effects on everyone. When considering about the government's decision to create the WASB, it can be seen that public interest theory most likely has a role here to play.

According to Vardon et al.'s (2007) study, standardized water accounting is an innovation originating in Australia to properly report the usage of water (Figure 1).

The GPWARs were proposed by the WASB and were created to be compliant with ED AWAS 1. The aim is to provide information to all potential users. It is user friendly, easy to understand and easily comparable to other reports which follow the same guidelines and rules.

The process of drafting the ED AWAS 1 was a highly collaborated one. It can then be seen that the standards were developed for the best interests of all involved parties. Up until the introduction of the first draft of standards, only those powerful stakeholders could receive their required information regarding various companies' water consumption (Figure 2).

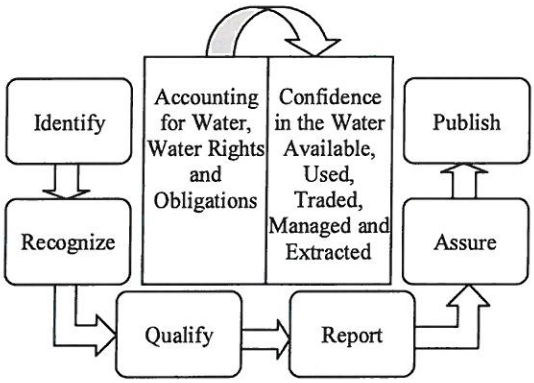

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Figure 1. The Process of Water Accounting

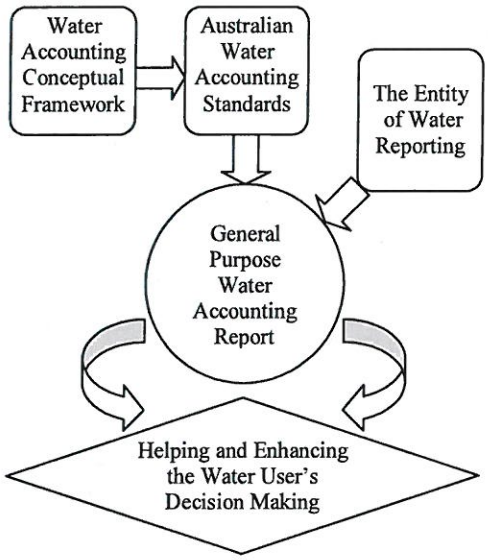

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Figure 2. The Process of Preparing General Purpose Water Accounting Report and the Relationship between the Report and Water User

This situation leads us to apply stakeholder theory, which is another theory related to sustainability reporting method and the WASB, specifically from the ethical perspective. Stakeholder theory holds that diverse groups of stakeholders exist in society and this theory explains how the expectations of those stakeholder groups are likely to influence corporate strategies. For this reason,

stakeholder theory has two branches: one is in the managerial perspective and the other one is in the ethical perspective.

Before the SKMS report was issued, the stakeholder theory in managerial perspective was applied to form the water accounting standards. This meant that only the primary stakeholders could receive the information they required and their expectations were the only things considered in the decision making process. Given that water is a scarce and valuable resource in Australia, interests of all stakeholders should be regarded vital and all decisions based on water usage should have an effect on everyone (Bell and Quiggan, 2008).

This kind of situation leads the ethical perspective of stakeholder theory to be applied in the revision of the WASB. The information, regarding the efficient usage of water by the BOM and other members in the water industry, need to be made with full disclosure. In order to gauge how effective the standard can be, more and more organisations need to adopt the ED AWAS 1. Deegan (2009) concluded that the full disclosure of any positive or negative information by an organisation can actually allow it to gain more support from the relevant stakeholders.

Sustainability reporting method has begun to be used in many areas of Australia since 1990s. According to Farneti and Guthrie's (2009) study, public sector organisations have begun to adopt a triple bottom line approach to do accounting. The main reason is that it allows them to disclose information to stakeholders, leading to an improvement in organisational performance (Collett, et al., 2001). Although the process has experienced slow adoption in the entire public sector, it has become more acceptable as the ethical method is used to issue reports. The same results may be applied to the standards set by the WASB. As application scope of the ED AWAS 1 expands, stakeholders would receive more information on the effective usage of resources.

A recent report on the sustainable usage of natural resources in Australia suggests that an organisation, or a department of government, will follow regulations to meet the standards of society (Qian and Burritt, 2009). If the organisation was non-compliant, legal action may be taken against the organisation. To encourage adoption of the ED WAS 1, punishments such as a whopping monetary fine or restrictive quota on water usage may be applied (Bureau of Meteorology, 2010).

The decision of the Australian Commonwealth Government to introduce the WASB can be explained in terms of the public interest theory as well as the stakeholder theory in ethical branch. Prior to the introduction of the first water accounting standard in the world, only those stakeholders were considered to be 'powerful' for receiving information and influencing the decisions on distributing and using water, which is a kind of natural resource that is essential for people's survival (Gardner and Bowmer, 2007). Due to the impact that these decisions should be made regarding society as a whole, it is imperative that all involved parties are provided with information in relation to the consumption of such a scarce resource. The development of the WASB is helping to accomplish this goal (Connell et al., 2005).

3. The Effects of Water Accounting Standards Board

Consequently, the present study discusses whether or not the WASB is likely to be effective. In order to do so, we review the system-oriented legitimacy theory as well as the public interest theory of regulation implementation. We also examine any threats which the WASB mandate may face through looking at the capture theory of regulation implementation.

Legitimacy theory asserts that organisations continually seek to ensure that they are perceived as operating within the bounds and norms of their respective societies (Deegan, 2009). It is widely acknowledged that organisations which do not operate within these evolving norms and do not provide information consistent with the adoption of these norms will be penalised by the society in which they operate.

Water can be seen by all members of society as a precious resource, especially in a dry climate such as Australia which currently still has the highest water usage per capita (Crase and O'Keefe, 2009). With resources dwindling and the growing need to account for the use of these precious resources, it is foreseeable that water accounting and the preparation and presentation of general purpose of water accounts, for those companies heavily reliant on the resource, may become part of general accounting practices as well as forming part of the information required by society. With this information, society will be able to determine whether a company or business is in fact operating within the 'social contract'.

Nowadays, the non-provision of information in economy is often seen as bad news and can severely impact the perceived legitimacy of an organisation. Due to this, it is likely that any organisation that falls under the requirement to account for their water usage activities will do so as it is in their best interest (DEWR, 2007).

Environmental issues are becoming increasingly important at the forefront of societies expectations. It can be consistently seen that those companies with poor environmental performance are

expected to repair or prevent any damage and pollution they may cause (Gardner and Bowmer, 2007). These companies may also find it increasingly difficult to obtain the financial support and resources which are necessary for them to continually operate. The general purpose of water accounting is to establish a system in which many water dependant companies will be able to paint a better environmental picture themselves.

Legitimacy is vital to an organisation's survival and, as such, management would pursue strategies which can be likely to increase the level of legitimacy. The provision of information and disclosures required by water accounting standards is a way in which management can increase perceived legitimacy and illustrate that it is acting responsibly for its usage of water resources. It must be admitted that this illustration can be symbolic or substantive. The introduction of water accounting and the preparation of GPWARs can be seen as a tool which an organisation can use to increase or maintain their perceived legitimacy within society. The table below (Table 1) shows what the General Purpose Water Accounting Reports are expected to comprise.

Table 1. The Key Parts of General Purpose Water Accounting Reports

1.	An Assurance Statement
2.	A Contextual Statement
3.	An Accountability Statement
4.	A Statement of Physical Water Flows
5.	A Statement of Water Assets and Water Liabilities
6.	A Statement of Changes in Water Assets and Water Liabilities

Source: 1. Water Accounting Factor Sheet, the Institute of Chartered Accountants in Australia *http://www.charteredaccountants.com.au*

2. Water Regulations 2008, Water Accounting Standards Board *http://www.bom.gov.au/water/regulations/index.shtml*

As stated above, public interest theory suggests that regulation is initially put in place to benefit society as a whole and not the vested interests of the regulators or other parties (Collett, et al., 2001). The development of ED AWAS 1 was a highly collaborated effort involving people with backgrounds in many disciplines such as public administration, chartered accounting, water management and standard setting. The process also involved excessive stakeholder consultation by considering both water and accounting organisations (Grafton and Peterson, 2007).

The current study would assume that this collaborative process will continue through the development of further water accounting standards and it can hence be seen that this standard and those followed will have and be set with the best interests of all involved, including the public interest. As these regulations appear to be developed to benefit society as a whole, it is likely that they will gain more support than the situation when they aim to benefit the vested interests of organisations, governments or standard setters.

Although water accounting regulations may be initially set to protect the public interest, it is possible that those regulations will ultimately come to control the regulator. This is one of the potential threats to the efficiency of the WASB and is known as the 'capture theory'. The capture theory states that although regulation may be initially introduced to protect the interests of society, it is likely that ultimately this will not be fulfilled. Those being regulated will seek to gain control of the regulator because the decisions made will ultimately have marked impact on them and the industry in which they operate.

It may be difficult for the WASB to remain independent of those which it is regulating because the WASB's ultimate survival may depend on it satisfying the expectations of these organisations. This will result in the 'capture effect' of the Board and the regulated organisations would push the WASB to ensure that any further release can give them an advantage. If the Board were 'captured' by the regulated organisations, it would potentially be led to implement inefficient policies which protected the vested interests of the organisations but not the public. This would then result in the inefficient water allocation and utilization (McKay and Marsden, 2009).

In brief, this study suggests that the WASB and the Water Accounting Standards which are subsequently released would become more successful and efficient. Water Accounting is likely to be adopted by those have legal requirements to report and it can be used as a tool to increase perceived legitimacy by presenting good environmental information regarding organisations' water usage. The non-provision of this information would be seen by society as a bad behaviour which may result in little support for the entity and make it difficult for them to obtain the resources they need. The initial standards also seem to be introduced for the public's best interest which means it is more likely to gain public support.

4. Conclusion and Discussion

In summary, water scarcity and consumption has become an increasing priority for a country with serious water shortage problem, like Australia. In order to manage this issue, it is essential to have the Water Accounting Standards Board to

implement a sustainable water usage plan for the country at the very beginning. The Board, which is the water accounting standard setter of whole Australia, established the framework of water accounting.

In the present study, we have described the Australian governance arrangements for water quality and quantity. We also have applied capture theory, legitimacy theory, public interest theory and stakeholder theory to analyse the development of the Water Accounting Standards Board and water accounting standard in this country. Although the focus of our study is national, the implications revealed are international. Moreover, we used a few theories to limit the scope of our study because they have been proved to be useful to explain the development of financial recording and reporting. Thus, further research can predict the trend of resetting water accounting standards.

To conclude, the theoretical perspectives of public interest theory and stakeholder theory, specifically the ethical branch from these two theories, are important in developing and implementing water reporting standards. The theoretical perspectives of public interest theory and legitimacy theory are also vital in determining how effective the standard will be towards the whole society. Last but not least, the theoretical perspective of capture theory is important in highlighting the threats which would be generated, if the Water Accounting Standards Board is controlled by high water consumption industries and enterprises.

Acknowledgments:

The authors would like to thank the editor, the anonymous referee, Prof. Shengshui Hu, Dr. Hao Zhang, Dr. Mian Yang, Miss Libo Zhang and participants at the International Conference on Management and Information Engineering (Wuhan, China 2012) and seminars participants at Wuhan University, Central China Normal University and University of Canberra for their helpful suggestions and comments.

We will give special thanks to Mr. Jinhai Ye for providing useful research reports and reviewing the paper. Part of the work on this paper was completed when the first author was working as a post-doctoral researcher in the University of Canberra. We are indebted to Economics and Management School of Wuhan University for financial support.

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